

CLAIMS

1. (Original) Process for the production of particle beam systems (10-10''', 12-12'') in which at least one first particle beam system (10) is formed on a first substrate (14) by particle beam-induced deposition, characterized in that at least one second particle beam system (12) is produced on at least one second substrate (16) by the minimum of one first particle beam system (10) using computer-guided, particle beam-induced deposition, whereupon the minimum of one second particle beam system (12) is used to produce at least one additional first particle beam system (10') on the first substrate (14) by computer-guided particle beam-induced deposition.

2. (Original) Process according to Claim 1, characterized in that first and second particle beams systems (12', 12'', 10'', 10''', 10''') are produced in alternation by the second and first particle beam systems, respectively, already existing on the substrates (14, 16).

3. (Previously Presented) Process according to Claim 1, characterized in that the first and the second substrates (14, 16) are offset from each other in such a way that free surfaces (18-18''') of one substrate (16) are opposite the particle beams systems (10-10''') already existing on the other substrate (14), so that the particle beam systems (10-10''') of the one substrate (14) can produce particle beam systems on the free surfaces (18-18''') of the other substrate (16).

4. (Original) Process according to Claim 3, characterized in that the substrates (14, 16) are positioned under the control of a computer (20).

Claims 5-38 (Canceled)

39. (Previously Presented) Process according to Claim 3, characterized in that

said substrates (14, 16) are positioned with respect to each other by piezoelectric elements (22, 24).

40. (Previously Presented) Process according to claim 1, characterized in that: before said particle beams systems are produced on said substrates, circuit elements (26), especially wiring elements (28), are produced, by means of which at least some of said particle beam systems are electrically connected; and each said particle beam system (10-10'', 12-12'') is tested electrically after it is produced.

41. (Previously Presented) Process according to claim 1, characterized in that: said particle beam systems are produced on contact points (34) provided on said substrate (14); and said particle beam systems are arranged next to each other like the teeth of a comb on a substrate.

42. (Previously Presented) Process according to claim 1, characterized in that said first and/or second particle beam systems evaluate image signals produced by scanning.

43. (Previously Presented) Process according to claim 1, characterized in that: the focusing, stigmatism, and deflection of the particle beam are carried out in an automatic sequence, and in that each particle beam system is focused individually; and the deposition is carried out by computer-guided ion beam-induced or electron beam-induced deposition; and the deposition of the first particle beam system to be produced is carried out by deposition with a computer-guided microscopic scanning probe at low voltages of approximately 100 V to approximately 40 kV.

44. (Previously Presented) Process according to claim 1, characterized in that: a certain number of particle beam systems are produced and completely configured,

whereupon these particle beam systems, which are arranged in blocks, are suitably supplied with gases and work in parallel to produce additional particle beam systems; and the particle beam systems are driven and controlled in groups by a control system comprising electronic control and programming circuitry.

45. (Currently Amended) Process according to claim 44, characterized in that: individual comb-like arrays of particle beam systems are reproduced, assembled into fabrication systems, and configured; the blocks are all produced together in a single process, without the need for further assembly; and, the beam axes of the particle beam systems (~~see Figures 3-6~~) are ~~more-or-less~~ substantially perpendicular to the surface of the substrate.

46. (Previously Presented) Device for the production of particle beam systems (10-10''', 12-12''), with a first substrate (14), where at least one first particle beam system (10-10'''), produced by computer-guided particle beam-induced deposition, is located on the first substrate (14), characterized in that at least one second substrate is provided; in that the first and the minimum of one second substrate (14, 16) are arranged at an offset from each other in such a way that free surfaces (18-18''') of one substrate (16) are opposite the particle beam systems (10-10''') already present on the other substrate (14), so that the particle beams systems (10-10''') of the one substrate (14) can produce particle beam systems on the free surfaces (18-18''') of the other substrate (16).

47. (Previously Presented) Device according to claim 46, characterized by a computer (20), which is set up for programming in such a way that it can control the positioning of the substrates (14, 16).

48. (Previously Presented) Device according to claim 47, characterized by:

piezoelectric elements (22, 24) for the substrates (14, 16), which make it possible to position the substrates with respect to each other under computer control after evaluation of the image of the free base points; testing means, such as means for image reproduction, means for detection and display of electrical current and secondary electron values, and other display means, which are designed to test each particle beam system (10-10''', 12-12'') on the substrates (14, 16); and, the first and second substrates (14, 16) are semiconductors, especially silicon.

49. (Previously Presented) Device according to claim 46, characterized in that the first and second substrates (14, 16) are nonconductors, especially glass, ceramic, or quartz.

50. (Previously Presented) Device according to claim 46, characterized in that the substrate has circuit elements (26), especially wiring elements (28), by means of which at least some of the particle beam systems are electrically connected.

51. (Previously Presented) Device according to claim 50, characterized in that the circuit elements comprise in particular computer-controlled particle beam current controllers, heating current controllers, particle beam deflection amplifiers, aperture deflection amplifiers, scanner generators, function generators with memory, lens adjusting means, lens voltage amplifiers, image signal amplifiers, astigmatism voltage amplifiers, and/or deflection voltage amplifiers.

52. (Previously Presented) Device according to claim 50, characterized in that: the circuit elements are in particular computer components such as central processing units, computer memory, cache memory, data memory, and circuits which perform routines stored in hardware, namely, the routines which make possible and are required

for the reproduction of the systems, for image acquisition and evaluation, and for the production of special new systems; the circuit elements which make possible and are required for the reproduction of the systems, for image acquisition and evaluation, and for the production of special new systems can be added sequentially by the multiplex method to the particle beam systems to be individually fabricated so that these systems can be controlled; and in order to hold a particle beam system (30), a substrate has a surface (32) with a width of approximately 2 μm to approximately 2,500 μm and a length of approximately 10 μm to approximately 100 mm; and a substrate (14) has contact points (34) for particle beam systems; and particle beam systems are arranged next to each other like the teeth of a comb on a substrate; and at least one first and at least one second particle beam system are equipped with measuring and stabilizing circuits, which serve to measure and to stabilize the particle beam radiation; and, circuit elements are provided which supply the particle beam systems with voltage and current and which can be adjusted and programmed by data in memory.

53. (Previously Presented) Device according to claim 46, characterized in that the particle beam systems are provided with means designed to execute an automated testing procedure, which ensures the functionality and stability of the radiation, of image recording, and of image evaluation.

54. (Previously Presented) Device according to claim 46, characterized in that: the particle beam systems are connected to image display means such as picture screens or large-format screens, where the image is divided in correspondence with the individual particle beam systems, so that the work of the system can be monitored and the results made available for use elsewhere; the particle beam systems have electron sources or gas

or liquid ion sources; and, the image display means have data-reduction routines to support the monitoring process and to guarantee that essentially the only data which must be stored are error data.